

Model Optimization and Tuning Phase Template

Date	10 July 2024
Team ID	SWTID1720001058
Project Title	Panic Disorder Detection
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

The Model Optimization and Tuning Phase involves refining machine learning models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

Hyperparameter Tuning Documentation (6 Marks):

Model	Tuned Hyperparameters	Optimal Values
AdaBoost Classifier	learning_rate	0.05 - 1
Gradient Boosting Classifier	learning_rate	0.05 - 0.3
Random Forest Classifier	max_depth: Maximum depth of individual trees n_estimators: Number of trees in the forest	100-200

		5-20
Regression (multilinear)	Number of CPU cores to use during computation	Integer, typically -1 for parallelization

Performance Metrics Comparison Report (2 Marks):

Model	Baseline Metric	Optimized Metric
Ada boost	Baseline accuracy:94.3 Baseline f1 score:0.98	optimized accuracy: 94.3 optimized f1 score: 0.98
Gradient descent	Baseline accuracy :95.6 Baseline f1 score:0.96	optimized accuracy : 95.9 optimized f1 score: 0.96
Random forest	Baseline accuracy: 94.65 Baseline f1 score:1	optimized accuracy:95.88 optimized f1 score: 1
Multilinear regression	Baseline accuracy: 90.56 Baseline f1 score:0.95	optimized accuracy: 91.3 optimized f1 score:0.96

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
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<p>Random Forest Classifier</p>	<p>Overall, the Random Forest classifier was likely chosen as the final optimized model for Panic Disorder detection due to its ability to handle complex, mixed data types, provide feature importance insights, and deliver robust performance suitable for clinical applications.</p> <p>Feature Importance: Random Forests provide a straightforward way to rank the importance of different features in predicting Panic Disorder. This can help clinicians understand which symptoms or factors are most indicative of the disorder.</p> <p>Robustness to Overfitting: Random Forests are less prone to overfitting compared to individual decision trees, thanks to ensemble methods like bagging and random feature selection. This robustness ensures that the model can generalize well to unseen data.</p> <p>Since f1 score is also 1 .</p>
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